VOKRACHKO, Yuriy Georgiyevich; DELERZON, Boris Samuilovich; IL'IN, Andrey Aleksandrovich; SALIVON, Stepan Alekseyevich; FAL'KOVICH, Boris Moiseyevich; FEDOROV, Yuriy Viktorovich; CHISTYAKOV, Ivan Pavlovich; OKUNEV, Yu.K., podpolkovnik, red.; SOKOLOVA, G.F., tekhn. red.

[Textbook for the second-class military driver] Uchebnik voennogo voditelia vtorogo klassa. [By] IU.G.Vokrachko i dr. Moskva, Voenizdat, 1963. 376 p. (MIRA 16:6)
(Automobile drivers)

PROCESSES AND PROPERTIES INDEX

30

FAL'KOVICH, D.G.

Kieselguhr as filler in the production of rubber soles. M. Sh. Ovrutskii and D. G. Fal'kovich. *Legkaya Prom.* 5, No. 3/4, 27(1945).—Satisfactory rubber was produced with kieselguhr from the Georgian S. S. R. contg. SiO_2 94.14, TiO_2 0.00, Fe_2O_3 0.28, CaO 0.85, MgO 0.17, and Al_2O_3 1.13%. W. R. Henn

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

APPROVED FOR RELEASE: 03/13/2001 CIA-RDP86-00513R000412410016-2"

BRENNER, M.I., inzhener; FAL'KOVICH, D.G., inzhener.

Bettor use of raw hides. Leg.prom. 16 no.2:23-24 F '56.
(Leather industry) (MLRA 9:7)

BRENNER, M.I., inzhener; FAL'KOVICH, D.G., inzhener.

Evaluating the industrial capacity of leather plants. Leg.prom.17 no.3:6-7 Mr '57. (MLRA 10:4)
(Leather industry) (Industrial capacity)

LITVINOV, M.R.; FAL'KOVICH, D.R.

Increase tanning properties of liquors produced of defective raw materials. Leg.prom. 18 no.11:24 N '58. (MIRA 11:12)
(Tanning materials)

FALKOVICH, I. E.

Behavior of volatile acids during the distillation of wine. I. E. Fal'kovich. *Vinodelie i Vinogradarstvo S.S.S.R.* 15, No. 7, 45-8(1955).—In distg. wine materials for cognac, it was found that the amt. of titrated acids was higher in the first few fractions. This is explained by the fact that the sulfurous acid and CO_2 in the original material is distd. over first and is titrated with the volatile acids. S. B. R.

med

FAL'KOVICH, L., kand.ekon.nauk (Novosibirsk)

Let's intensify the struggle for the elimination of the waste of goods. Sov. torg. 33 no. 9:44-45 S '60. (MIRA 14:2)
(Retail trade)

FAL'KOVICH, L. (g.Novosibirsk)

Potentialities for the reduction of expenses. Sov. torg. 35 no.3:24-25 Mr '62. (MIRA 15:3)
(Novosibirsk--Commerce)

APPROVED FOR RELEASE: 03/13/2001 CIA-RDP86-00513R000412410016-2"

FAL'KOVICH, L. (Novosibirsk); UPOROV, N. (Novosibirsk)

Inventories. Sov. torg. 36 no.3:33-34 Mr '63. (MIRA 16:3)
(Inventories)

FALKOVICH, L.I., ZILBER, L.A., and ARKHINA, E.V.

"Methods for Isolating Epidemic Influenza Virus," Zhu. MEIB, V. 18, pp. 554-568, 1937.

Central Virus Lab.

USSR/Microbiology - Microorganisms Pathogenic to Humans and Animals. F-4

Abs Jour : Ref Zhur - Biol., No 10, 1958, 43324

Author : Falkovich, L.I., Voronkova, O.I.

Inst : ——

Title : Further Study of Isolation of a Filterable Scarlet Fever Agent.

Orig Pub : Nauchn. tr. Mosk. n.-i. in-t vaktsin i syvorotok, 1955, 6, 93-97.

Abstract : No abstract.

Card 1/1

FALKOVICH, L. I.

USSR/Microbiology - Medical and Veterinary Microbiology F-4

Abs Jour : Referat Zhurn - Biol. No 16, 25 Aug 1957, 68576

Author : Falkovich, L.I., Voronkova, O.I., Arkhina, E.V.
Title : Experimental Infection of Animals by Isolated Avisual Form of Streptococcus.

Orig Pub : Nauch. tr. Mosk. n.-i. in-t Vaktsin i Sivorotok, 1956, 6, 79-82

Abstract : The injection of a filterable avisual form of scarlatinal streptococcus (SS) (Russian AS), isolated from scarlet fever patients, into the veins of rabbits caused a rise of temperature, skin-reddening of the ears and sides with subsequent peeling, swelling of mucous membrane of the nose and lips, leucocytosis with pseudoeosinophylia, changes in urine indicating kidney involvement. In pathologico-anatomic examination there was noted a reaction of the tissues of all organs, which expresses itself mainly in a degeneration of their parenchyma. The material

Card 1/2

USSR/Microbiology - Medical and Veterinary Microbiology F-4

Abs Jour : Referat Zhurn - Biol. No 16, 25 Aug 1957, 68576

from the ill rabbits, injected into mice, caused in the latter typical manifestations for avisual forms of streptococci which were neutralized by specific sera and sera from scarlet fever convalescents.

Card 2/2

KAZAKOVA, L.P.; LAZAREVA, I.S.; SHCHEGROVA, K.A.; FAL'KOVICH, M.I.

Studying solid hydrocarbons of the petroleums of Kuybyshev Province.
Izv. vys. ucheb. zav.; neft' i gaz 6 no.2:56-62 '63. (MIRA 16:5)

1. Moskovskiy institut neftekhimicheskoy i gazovoy promyshlennosti imeni akademika I.M.Gubkina.

(Kuybyshev Province—Hydrocarbons)

GLAZOV, G.I.; FAL'KOVICH, M.I.; CHERNOZHUKOV, N.I.

Some recommendations for the dewaxing of distillate oils.
Nefteper. i neftekhim. no. 3:7-10 '64. (MIRA 17:5)

1. Moskovskiy ordena Trudovogo Krasnogo Znameni institut neftekhimicheskoy i gazovoy promyshlennosti im. akademika Gubkina.

ACCESSION NR: AP4026848 S/0065/64/000/004/0016/0021

AUTHORS: Glazov, G.I.; Unksova, L.Ye.; Fal'kovich, M.I.; Chernozhukov, N.I.

TITLE: Intensifying the process of deparaffination of distillate raffinates

SOURCE: Khimiya i tekhnologiya topliv i masel, no. 4, 1964, 16-21

TOPIC TAGS: raffinate, deparaffination, solvent, deparaffination intensification, batch solvent addition, acetone toluene solvent, high acetone solvent

ABSTRACT: The possibility of intensifying the deparaffination of raffinates by adding a solvent containing 60% or more acetone to the crude oil at the start of the dilution was verified. Experiments were run comparing a single addition with three batch-wise additions of solvent to the basic crude oil (a wide fraction of raffinate with 6.7 centistokes viscosity at 100C, with 90% potential oil content) to be deparaffinated; acetone-toluene was the solvent;

ACCESSION NR: AP4026848

the cooling rate was 100-120C/hour, and filtration was at -25C under 400 mm. Hg. The solvent added initially to the crude oil should contain 60-80% acetone. The amount of solvent used and its temperature affect the deparaffination process. For the second dilution the solvent was fed to the cooled crude oil at 0-15C in such amounts thast the overall acetone content in admixture with the toluene is 45-50%. The third portion of solvent was added to the solution cooled to nearly the filtering temperature in such amounts that the acetone content in the total solvent after all three stages of addition was 30%. The batch-wise addition of the acetone-containing solvent in comparison to the single stage addition of solvent to the crude oil is more economical, giving a larger amount of oil with a higher paraffinic-naphthenic content and reduced aromatics and resins. The use of a solvent containing over 60% acetone permitted effective deparaffination of broad distillate fractions with viscosities up to 10 centistokes at 100C. Recovery of the deparaffinated oil was increased 3-5% and the rate of

ACCESSION NR: AP4026848

filtration was increased by 70%. In narrow distillate fractions obtained on a vacuum column by boiling up to 460C, the results of deparaffination seem independent of the method of solvent addition. In the high boiling fraction, 450-480C, the batch-wise additon was again more favorable, giving a higher yield of oil and a more porous filter cake. Orig. art. has: 4 tables and 2 figures.

ASSOCIATION: MINKh i GP im. I. M. Gubkina (Moscow "Order of the Red Banner of Labor" Institute of the Petrochemical and Gas Industry)

SUBMITTED: 00 DATE ACQ: 28Apr64 ENCL: 00

SUB CODE: FL NR REF SOV: 002 OTHER: 001

Card 3/3

PAL'KOVICH, M.I.

Leaf roller moth Evetria Hb. (Lepidoptera, Tortricidae) of the Busuluk Pine Forest. Ent.obos. 33:123-127 '53. (MLRA 7:5)

1. Kafedra obshchey entomologii Leningradskogo sel'skokhozyaystvennogo instituta. (Busuluk Pine Forest--Leaf rollers)
(Leaf rollers--Busuluk Pine Forest)
(Pine--Diseases and pests)

FAL'KOVICH, M.I.

New and little-known species of the genus Argyroploce (s. lat.) from southern Siberia (Lepidoptera, Tortricidae) [with summary in German]. Ent. oboz. 38 no.2:460-466 '59. (MIRA 12:7)

1. Zoologicheskiy institut AN SSSR, Leningrad.
(Siberia--Leaf rollers)

FAL'KOVICH, M.I.

Phiaris captiosana, sp.n., as a vicarious species of Phiaris arcuella Cl. (Lepidoptera, Tortricidae) in eastern regions of the Palaeo-Arctic. Ent. oboz. 39 no.3:690-692 '60. (MIRA 13:,)

(Far East--Leaf rollers)

CHERNOZHUKOV, N.I.; FAL'KOVICH, M.I.; GERVITS, E.S.; Prinimali uchastiye:
BUROVA, V.M., studentka; VOROB'YEVA, Z.P., studentka.

Separation of paraxylene from a mixture of xylenes. Khim. i tekh.
topl.i masel 7 no.1:19-24 Ja '62. (MIRA 15:1)

1. Moskovskiy institut neftekhimicheskoy i gazovoy promyshlennosti
im. akad. Gubkina.

(XYLENE)

DANILEVSKIY, A.S.; KUZNETSOV, V.I.; FAL'KOVICH, M.I.

Leaf rollers (Lepidoptera, Tortricidae) of the mountainous districts of southern Kazakhstan. Trudy Inst. zool. AN Kazakh. SSR 18:69-116 '62. (MIRA 17:3)

FAL'KOVICH, M. I.

New species of the tribe Olethreutini(Lepidoptera, Tortricidae) from the U.S.S.R. Trudy Zool. inst. 30:353-368 '62.
(MIRA 15:10)

(Soviet Far East—Leaf rollers)

FAL'KOVICH, M. I.

Use of secondary sexual characters in the classification of the subfamily Olethreutinae(Lepidoptera, Tortricidae). Ent. oboz. 41 no.4:878-885 '62. (MIRA 16:1)

1. Zoologicheskiy institut AN SSSR, Leningrad.

(Olethreutidae)

FAL'KOVICH, M.I.

Leaf rollers (Lepidoptera, Tortricidae) of Leningrad Province.
Trudy Zool.inst. 31:49-80 '62. (MIRA 16:1)
(Leningrad Province—Leaf rollers)

FAL'KOVICH, M.I.

New species of the family Cochylidae (Lepidoptera) from Kazakhstan and the Caucasus. Zool. zhur. 42 no.5:697-703 '63. (MIRA 16:7)

1. Zoological Institute of the Academy of Sciences of the U.S.S.R., Leningrad.

(Kazakhstan—Moths) (Caucasus—Moths)

FAL'KOVICH, M.I.

New and little-known species of leaf rollers (Lepidoptera, Tortricidae) from Kazakhstan. Trudy Zool. inst. 34:266-282 '64. (MIRA 18:2)

APPROVED FOR RELEASE: 03/13/2001 CIA-RDP86-00513R000412410016-2"

FALKOVICH, M.I.

Casebearers (Lepidoptera, Coleophoridae) injurious to the larch in the U.S.S.R., their distribution and historical relations to the host plants. Zool. zhur. 43 no.6:851-858 '64. (MIRA 17:12)

1. Zoological Institute, Academy of Sciences of the U.S.S.R., Leningrad.

L 10190-66 EWT(m)/EWP(j)/EWA(c) RPL RM

ACC NR: AP5028459 SOURCE CODE: UR/0286/65/000/020/0023/0023

AUTHORS: Genkina, Ye. V.; Fal'kovich, M. I.; Artem'yev, A. A.; Zenkina, N. G.

ORG: none

TITLE: Method for obtaining caprolactam. Class 12, No. 175513 [announced by State Scientific Research and Planning Institute of the Nitrogen Industry and Products of Organic Synthesis (Gosudarstvennyy nauchno-issledovatel'skiy i proyektnyy institut azotnoy promyshlennosti i produktov organicheskogo sinteza)]

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 20, 1965, 23

TOPIC TAGS: polymer, polymerization, catalyst, catalytic polymerization, catalytic regeneration, silver

ABSTRACT: This Author Certificate presents a method for obtaining caprolactam by passing nitrocyclohexane vapors and hydrogen gas over a dehydration catalyst—boric acid on silica gel at a temperature of 300—360C. To increase the yield of caprolactam and the degree of conversion of nitrocyclohexane and to prolong the useful lifetime of the catalyst as well as to insure its regeneration, silver is used as the catalytic promoter.

SUB CODE: 11/ SUBM DATE: 16Jan65/

Card 1/1 UDC: 547.466.3.07

L 21105-65 EWT(m)/EPF(c)/T Pr-4 DJ

B

ACCESSION NR: AP4049881 S/0318/64/000/003/0007/0010

AUTHOR: Glazov, G. I., Fal'kovich, M.I., Chernozhukov, N.I.

TITLE: Some recommendations for dewaxing distillate oils

SOURCE: Neftepererabotka i neftekhimiya, no. 3, 1964, 7-10

TOPIC TAGS: petroleum refining, distillate oil, oil dewaxing, solvent extraction

ABSTRACT: The authors studied the influence which the conditions of dilution of the stock and the rate of cooling of its solutions have on the process of dewaxing of distillate oils. The stock used was the distillate raffinate of a wide fraction (350-490C) of Korobkovo petroleum obtained at the Volgogradskiy NPZ (Volgograd Petroleum Refinery) All the experiments were carried out under laboratory conditions with a Buchner funnel at 500 mm Hg pressure. At a filtration temperature of -25C and a cooling rate of 140-160 deg/hr, when ketone-toluene mixtures were used, their optimum content of acetone and methylethyl ketone was 27-30 and 40-55%, respectively. In further experiments, the solvents used were acetone-toluene mixtures. The effect of the temperature of mixing of the stock and of the solvent on the characteristics of the dewaxing (yield of

L 21105-65

ACCESSION NR: AP4049881

oil, filtration rate of the solvents, solidification temperature of the oil) was determined. A detailed study was made of the dependence of the yield of relatively oil-free paraffin on the filtration temperature of the solution and on the acetone content of the solvent mixture. The following conclusions were reached. In dewaxing distillate raffinates of Korobkovo petroleum by feeding of the solvent to the stock in portions, the characteristics of the process are improved by: (1) decreasing the temperature of mixing of equally cooled first portions of the solvent and stock; (2) decreasing the amount of the first portion of solvent; (3) feeding the last portion of solvent to stock cooled down to the filtration temperature of the solvent; (4) reducing the cooling rate of the solution in a temperature range close to the filtration temperature. Orig. art. has: 3 figures and 1 table.

ASSOCIATION: MINKh i GP

SUBMITTED: 00 ENCL: 00 SUB CODE: FP

NO REF SOV: 000 OTHER: 000

Card 2/2

GLAZOV, G.I.; UNKSOVA, L.Ye.; FAL'KOVICH, M.I.; CHERNOZHUKOV, N.I.

Intensifying the dewaxing of distillate raffinates. Khim. i tekh. topl. i masel 9 no.4:16-21 Ap '64. (MIRA 17:8)

1. Moskovskiy ordena Trudovogo Krasnogo Znameni institut neftekhimicheskoy i gazovoy promyshlennosti im. akad. Gubkina.

Z/011/61/018/001/009/014
E112/E453

AUTHORS: Goldberg, K.M., Gelfandbein, N.K., Falkovich, M.M.

TITLE: Automatic control of alcoholysis during alkyd resin production

PERIODICAL: Chemie a chemická technologie, 1961, Vol.18, No.1, p.32, abstract CH 61-442 (Lakokras. Materialy, 1960, No.1, pp.75-78)

TEXT: An apparatus is described which registers changes in electric conductivity of the reaction mixture and determines from the change of resistance the equilibrium reached in the system: vegetable oil-polyvalent alcohol. The apparatus permits to determine optimum times for the duration of the alcoholysis. Side-reactions can thus be minimized and an alkylated product of standard quality can be obtained.
1 sketch, 4 diagrams, 3 tables, 8 literature references.

[Abstractor's note: Complete translation.]

Card 1/1

FAL'KOVICH, Mariya Mikhaylovna; LAGUNOVA, M.V., red.

[The most frequently used words in English; for language institutes. Textbook for students enrolled in courses 1-5 of institutes and schools of foreign languages] Leksicheskii minimum po angliiskomu iazyku; dlia iazykovykh vuzov. Uchebnoe posobie dlia studentov I-V kursov institutov i fakul'tetov inostrannykh iazykov. Izd. 2. Moskva, Vysshaia shkola, 1964. 338 p. (MIRA 17:7)

SOV/137-59-3-5266

Translation from: Referativnyy zhurnal. Metallurgiya, 1959, Nr 3, p 49 (USSR)

AUTHOR: Fal'kovich, N. M.

TITLE: Preparation of Elements of Toroidal Fairings From Cylinders to Cones for Dust Collectors, Scrubbers, and Electrostatic Precipitators of Blast Furnaces (Izgotovleniye elementov toroidal'nykh perekhodov ot tsilindrov k konusam v pyleulovitelyakh, skrubberakh i elektrofil'trakh domennykh pechey)

PERIODICAL: V sb.: Materialy po stal'n. konstruktsiyam. Vol I. Moscow, 1957, pp 181-192

ABSTRACT: The areas of fairing from cylinders to cones undergo the greatest stress and are the most important areas of the metal structure of dust collectors, scrubbers, and electrostatic precipitators. In 1955 at the Dnepropetrovsk metal-fabricating plant toroidal fairings (TF) were prepared to take the place of the ordinary angular junctures of cones and cylinders. TF for blast furnaces of 1033 m^3 capacity were prepared by the rolling process. A description is given of the special structural features of various TF elements and devices for their roll forming, of a rational method for the lay-out of blanks

Card 1/2

SOV/137-59-3-5266

Preparation of Elements of Toroidal Fairings From Cylinders to Cones (cont.)

which was developed after experimental roll forming of several batches of TF elements, and of technological methods of roll forming of TF. It is pointed out that the cost of one ton of finished TF elements prepared by the roll-forming method was 1,171 rubles as compared to 10,000 - 12,000 rubles per ton when produced by the old stamping process.

L. Kh.

Card 2/2

FAL'KOVICH, N.M., inzhener.

Making booms for connecting cylindrical and conical parts of a dust collector. Stroi. prom. 35 no.3:45-46 Mr '57.
(MLRA 10:4)

(Dust collectors) (Metalwork)

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

FAL'KOVICH, R.A.

Ca

25

Improving the color and finish of rugs. R. A. Fal'kovich. Sbornik Nauch.-Issledovatel. Rabot Lab. Glavkovrokhozyaistvo 1939, No. 3, 114-30; Khim. Referat. Zhur. 1940, No. 4, 96.—Chlorination of the dyed yarn is proposed for improving the appearance of the rugs. Chlorination decreases only slightly the strength of the yarn, and increases considerably the fastness of the dye.

W. R. Henn

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

FAL'KOVICH R.A.

Determination of wetting power by measurement of the contact angle. R. A. Fal'kovich. *Tekstil. Prom.* 14, No. 4, 30-7(1951). The wetting degree of a hard surface is detd. by measuring the contact angle (I) formed at the intersection of 3 phases: solid, liquid, and gaseous. If I is acute the liquid wets the surface, if I is obtuse it does not. Technique used and 2 methods of calcn. are given.

Elisabeth Barabash

Fal'kovich, R.A.

16 7 8

Dyeing wool, cellulose, and mixed fixed fabrics. A. A. Panicheva, B. M. Bogoslovskii, R. A. Fal'kovich, M. A. Prunis, G. M. Stolyar, and M. K. [illegible] U.S.S.R. 106,809, Aug. 25, 1957. Addn. to U.S.S.R. 102,150 (C.A. 50, 17440) [illegible]

4E2c

4E3d

[illegible] and direct dyes

M. Hosch

PAL'KOVICH, S. B.

USSR.

Application of native bentonites for the clarification of wine. Pyzhevsk [Ukraine] bentonite. L. P. Lyubarskaya and S. B. Pal'kovich. *Vinodelie i Vinogradarstvo S.S.S.R.* 12, ~~No. 8, 18-19~~(1952).—Pyzhevsk bentonite (I) contains no Na. It consists of SiO_2 63.9, Al_2O_3 21.97, Fe_2O_3 2.47, CaO 2.20, and MgO 5.12%, and traces of TiO_2; the loss on calcination is 4.28%. Aq. suspension of I gives neutral reaction. I suspended in 0.6% Na_2CO_3 soln. is a very effective clarifying agent; a sample of I, previously swollen in 0.6% Na_2CO_3 soln., is suspended in a water-wine (6:4) mixt., the suspension, boiled for 10 min. and in the hot state, added to the wine to be clarified in the amt. of 1-1.5 g. dry I/l. Six different wines so treated were clarified within the period from 6 (cider wine) to 17 days (red table wine), resp. Bentonites and clays of Uzbekistan. E. M. Bueverova, G. P. Sidyakin, and A. V. Turulov (Viniculture, Uzbekistan). *Ibid.* 20.—Based on their clarifying effect, the bentonites and clays of Uzbekistan are divided into 3 groups, from which 2 groups comprise highly effective clarifiers when given in the amts. of 0.9-1.5 g./l. wine. E. W.

NEPOMNYASHCHA, M.L.; MEDVINS'KA, L.Yu.; FAL'KOVICH, S.B.

Cases of infection of table wines with Lactobacillus. Mikrobiol. zhur. 15 no.2:81-84 '53. (MLRA 7:3)

1. Z Institutu mikrobiologii AN URSR ta TSentral'noi enokhimichnoi laboratorii Ukrgolovvino.
(Wine and wine making) (Lactic acid bacteria)

FAL'KKovich, S. [B]

Sulfitization of table wines during clarification. S. Fal'kovich and A. Ostrobrod. *Sadovodstvo, Vinogradarstvo i Vinodelie Moldavii* 10, No. 5, 59-60(1955).—Addn. of 50 mg. SO_2 to raw wine during clarification gives final products of great stability and better organoleptic properties. During the technological process a great portion of the SO_2 added is lost. The residual SO_2 was (*a*) 36.0-50.0 after addn. of clarifying agent and SO_2 and mixing, (*b*) 17.6-38.0 after filtration, and (*c*) 16.0-28.0 mg./l. after bottling, resp. Alc., titratable acidity, volatile org. acids, and pH are given for 4 different kinds of wine (Dry Kaberne and white, red and rose table wines). E. Wierbicki

(1)

FAL'KOVICH, S. F.

S/003/60/000/009/001/001
B019/B054

AUTHOR: Frankl', F. I., Doctor of Physical and Mathematical
Sciences, Professor

TITLE: Discussion of Problems of Hydroaerodynamics and
Mathematical Physics

PERIODICAL: Vestnik vysshey shkoly, 1960, No. 9, pp. 47-48

TEXT: A Conference on Hydroaerodynamics and Mathematical Physics was
held at Nal'chik in May 1960 on the initiative of the fiziko-
matematicheskiy fakul'tet Kabardino-Balkarskogo universiteta (Department
of Physics and Mathematics of the Kabardino-Balkarian University).
Fourteen reports were delivered at the Conference by delegates of five
higher institutes of learning and scientific institutes of the Northern
Caucasus, as well as of three higher institutes of learning from other
oblast' and Republics. The reports by Professor F. I. Frankl' and
Senior Teacher I. N. Lanin (Kabardino-Balkarian University) on "The Flow
Around Profiles With a Local Supersonic Zone Ending in a Compression

Card 1/4

Shock", by Professor S. V. Fal'kovich of Saratovskiy universitet
(Saratov University) on "The Integrals of the Chaplygin Equation With
Singular Points on the Parabolic Line", and Senior Teacher E. Kazimzaliyev
of Kirgizskiy universitet (Kirgiz University) on "The Application of
the Straight-line Method to Certain Boundary-value Problems in the
Theory of Transsonic Currents" dealt with the theory of transsonic currents.
Problems of theoretical meteorology were dealt with in the report by
L. N. Gutman, Doctor of Physical and Mathematical Sciences, of the
Kabardino-Balkarskoye otdeleniye Instituta prikladnoy geofiziki AN SSSR
(Kabardino-Balkarian Branch of the Institute of Applied Geophysics
of the AS USSR) ("On the Theory of Fronts"). Docent E. Ya. Sidorov
of the Stavropol'skiy sel'skokhozyaystvennyy institut (Stavropol'
Agricultural Institute) dealt with "Some Problems of Hydrodynamics
Within the General Theory of Atmospheric Circulations". Mal'bakhov,
Student of the Kabardino-Balkarian University, held a report on "The
Vertical Structure of Monsoons". M. Shekemukhov and N. Arkabayev, Post-
graduate Students of the Kabardino-Balkarian University, offered
"Examples of the Rotation of Cosmic Gas Masses" and "The Model of a Star

Card 2/4

as Steady Radial Flow of Gas Particles and Photon Gas". A. Abdyldayev,
Post-graduate Student of the Kabardino-Balkarian University, in his report
dealt with "Some Problems of the Plane-parallel Flow of Heavy Liquids in
Channels". Senior Teacher V. I. Men'shikova of the Stavropol'skiy
pedagogicheskiy institut (Stavropol' Pedagogical Institute) delivered a
report on "Semi-inverse Methods in the Theory of Motion of Ground Water
With a Free Surface". Problems of mathematical physics were dealt with
in three reports by Senior Teacher I. N. Karsayev of the Kabardino-
Balkarian University, Docent F. D. Baranovskiy of the Severoosetinskiy
pedagogicheskiy institut (North Ossetian Pedagogical Institute), and Docent
Ya. I. Nesis of the Stavropol' Pedagogical Institute. Docent V. N. Karp
of the Odesskiy politekhnicheskiy institut (Odessa Polytechnic Institute)
dealt with the theory of oscillations. Special attention was paid to a
report by Professor S. V. Fal'kovich who suggested a greatly improved
method of calculating transsonic currents, to a report by Professor L. N.
Gutman who suggested an interesting solution to one of the most important
problems of local meteorological phenomena, and to a report by N.
Arkabayev who gave an ingenious explanation of an important astrophysical

Card 3/4

phenomenon.

ASSOCIATION: Kabardino-Balkarskiy gosudarstvennyy universitet
(Kabardino-Balkarian State University)

ACC NR: AP6033202 SOURCE CODE: UR/0040/66/030/005/0848/0865

AUTHOR: Fal'kovich, S. V. (Saratov); Chernov, I. A. (Saratov)

ORG: none

TITLE: Self similar algebraic solutions to equations for two dimensional transonic gas flow

SOURCE: Prikladnaya matematika i mekhanika, v. 30, no. 5, 1966, 848-865

TOPIC TAGS: transonic flow, gas flow, dimensional flow, algebraic function

ABSTRACT: In the transonic velocity range the approximate equations describing gas flow possess an important class of self-similar solutions. Many properties of transonic flow, e.g., the nature of flow at a distance from the streamlined body, in Laval nozzles, etc., have been studied in the literature by using these solutions as the principal term. This paper investigates terms where the self-similar solutions are algebraic functions. Use of parametric representation of the desired variables made it possible in all cases to indicate the type of solution which is convenient in gasdynamic calculations. In the same way have been derived certain exact solutions of the Trichomi equations. These solutions may be used to study new properties of transonic flow: flow in Laval nozzles with interlocked ultransonic zones, flow in a nozzle whose contour includes a wall discontinuity, flow in the vicinity of the point

ACC NR: AP6033202

of intersection of a sonic line with the boundary of a sonic stream, etc. The object examined is twodimensional nonvortical motion of an ideal compressible fluid whose velocity everywhere differs little from the speed of sound. In the hodographic plane the approximate system of equations describing this flow is

$$\frac{\partial\varphi}{\partial\theta}+\frac{\partial\psi}{\partial\eta}=0, \qquad \frac{\partial\varphi}{\partial\eta}-\eta\frac{\partial\psi}{\partial\theta}=0 \tag{1}$$

(ψ is the stream function, φ is the velocity potential, η is the velocity function which becomes zero at the critical velocity, and θ is the angle of inclination of the velocity vector). The self-similar solutions of Eq. (1) which are examined are

$$\psi=\rho^{k}f(\xi), \quad \varphi=\rho^{k+1/3}g(\xi); \quad \rho=\sqrt{\theta^{2}+{}^{4}/_{9}\,\eta^{3}}, \quad \xi={}^{4}/_{9}\,\eta^{3}/\rho^{2}. \tag{2}$$

Equation (1) is converted into

$$\xi(1-\xi)f''+({}^{2}/_{3}-{}^{7}/_{6}\xi)f'+{}^{1}/_{3}k({}^{1}/_{3}k+{}^{1}/_{6})f=0 \tag{3}$$

and the values of k are found for which algebraic solutions of Eq. (3) may be found. Orig. art. has: 85 formulas, 10 figures.

SUB CODE: 12,20/ SUBM DATE: 12Mar66/ ORIG REF: 014/ OTH REF: 009

Card 2/2

L 40360-66 EWT(d)
ACC NR: AP6014234 SOURCE CODE: UR/0109/66/011/005/0785/0792

AUTHOR: Fal'kovich, S. Ye.

ORG: none

57
B

TITLE: Determining optimal space-time system for signal processing

SOURCE: Radiotekhnika i elektronika, v. 11, no. 5, 1966, 785-792

TOPIC TAGS: direction finding, signal processing, signal noise separation

ABSTRACT: The theory of statistical decisions is applied to the problem of optimal direction-finding system which is regarded as a system of space-time processing of signals; the latter are received in a wideband fluctuation noise uniformly distributed in space. It is shown that the thermal-type noise is both time- and space-correlated. However, with an error tolerable in engineering practice, this noise can be assumed noncorrelated, which helps in the approximate

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ACC NR: AP6014234

solution of many problems of detecting, direction finding, and resolution of both point and extensive targets by means of single- and two-dimensional antennas. Formulas for noise multidimensional correlation functions and likelihood ratios are developed, which permit solving the engineering problems of determination of an optimal space-time system, of calculating maximum errors in signal-parameter evaluations, and of other kindred problems. Orig. art. has: 34 formulas.

SUB CODE: 17, 09 / SUBM DATE: 25Jan65 / ORIG REF: 004 / OTH REF: 001

Card 2/2 cm

FALKOVICH, S.V.

Falkovich, S. V. Pressure of a rigid punch on an elastic semi-plane with ranges of sliding and adhesion on the line of contact. Appl. Math. Mech. [Akad. Nauk SSSR. Prikl. Mat. Mech.] 9, 425–432 (1945). (Russian. English summary) [MF 15350]

A rigid punch with plane base $ABOCD$, of length $AD=2b$, is in contact with the elastic half-plane $y<0$ along the portion $-b<x<b$ of the x-axis. The punch is pressed by a force P, acting along the y-axis and passing through the middle of the punch at O. The punch adheres to the half-plane along the portion BC of length $2a$, but the contact along AB and CD is assumed to be sliding and frictionless. The elastic problem is reduced to the determination of two functions of a complex variable, regular in the region $y<0$. The solution is given with the aid of elliptic functions and the formulas for normal and tangential stresses along the line of contact are obtained. [Cf. the preceding review.]

I. S. Sokolnikoff (Los Angeles, Calif.).

Source: Mathematical Reviews, Vol 8, No. 2

Inst Mechanics, AS USSR

FAL'KOVICH, S. V.

Prikladnaia Matematika i Mekhanika, 1946, Vol 10, No. 4, pp 503-512, "On the Theory of the Laval Nozzle," Translations available at Library of Congress Translation Center, Translation No. RT-323, and Battelle Memorial Institute, National Advisory Committee for Aeronautics, Technical Memorandum No. 1212.

"The author studies the motion of a gas in a plane Laval nozzle (two-dimensional) in the neighborhood of the transition from subsonic to supersonic regions. The method of attack is based on the transformation of the equation of motion and continuity to a form called by the author the canonical form for the system of differential equations of the mixed elliptic-hyperbolic type, to which the system of equations of the considered type of motion of an ideal compressible fluid reduces. By studying the behavior of the integrals of this system in the neighborhood of the parabolic line, the principal term of the solution is easily separated out in the form of a polynomial of the third degree. An analysis of the mathematical solution leads to the conclusion that the point of intersection of the axis of symmetry of the nozzle and the sound line is a singular point. The Frankl results, published previously, are thus obtained by a simpler method. The computation of the transitional part of the nozzle may be considerably simplified."

FAL'KOVIHH, S. V.

Prikladnaia Matematika i Mekhanika, 1947, Vol. 11, No. 1, pp 171-176, "Lift Force of a Wing of Finite Span," (Moskva. Institut Mekhaniki Adademii Nauk SSSR). Translations available at American Mathematical Society, Translation No. 10, Southwest Research; Brookhaven National Laboratory; and Library of Congress Translation Center, Translation No. RT-453.

"The linearized supersonic flow equations corresponding to a trapezoidal flat plate at small aggles of attack are solved by the application of acceleration potential (which somewhat simplifies the basic integral equation). Schlichting's error [Nat. adv. Comm. Aero. Tech. Memo. no. 897] at the tips of the plate is rediscovered."

FAL'KOVIBH, S. V.

Prikladnaia Matematika i Mekhanika, 1947, Vol. 11, No. 2., pp 223-230, "A Class of Laval Nozzles," (Moskva. Institut Mekhaniki Akademii Nauk SSSR). Translations available at Library of Congress Translation Center, Translation No. RT-426, and Battelle Memorial Institute, National Advisory Committee for Aeronauticds, Technical Memorandum No. 1236.

"The author develops a linearzed solution of the compressible flow equations which are valid in the neighborhood of the sonic singularity. Within the limits of the linearizing approximation a parallel subsonic flow is brought to sonic velocity, establishing a type of convergent divergent nozzle. An initial change of variable $ds = \sqrt{1 - M^2}\, dW/W$ (where W is the radius vector in the hodograph plane) is made, followed by a transformation using bipolar co-ordinates. The resulting linearized equation is solved in terms of hypergeometric functions."

FAL'KOVICH, S. V.

Prikladnaia Matematika i Mekhanika, 1947, Vol. 11, No. 3., pp 371-376, "Vibrations of a Wing of Finite Span in a Supersonic Flow'(Moskva). Translations available at Battelle emorial Institute, National Advisory Committee for Aeronautics, Technical Memorandum No. 1257, and Library of Congress Translation Center, Translation No. RT-497.

"The paper gives a theoretical solution to the problem of a supersonic flow past an infinitely thin vibrating dlta wing, under the assumptions of the conventional linearized-flow theory for nonsteady motion. The wing deformations, defined by an arbitrary distribution of small slopes over a reference plane which' replaces the actual surface, are developed in a Fourier series of the times. The constant term and harmonic are examined, dorresponding respectively to an arbitrary initial shape and arbitrary deformations. For the constant term, and for each harmonic, the corresponding asymptotic states of flow (steady and periodic) are difined in terms of complex potentials. The latter are represented by multiple series defined in curvilinear co-ordinates, and containing Bessel and harmonic functions of the latter. The method is limited to symmetrical delta wings entirely inside their Mach cones. No application is given, and the effective numerical procedure appears to be quite involved."

Falkovich S V

Falkovich, S. V. On the theory of a wing of finite span in a supersonic flow. Appl. Math. Mech [Akad. Nauk SSSR. Prikl. Mat. Mech.] 11, 391–394 (1947). (Russian. English summary)

In this paper a method for the determination of the velocity potential $\varphi(x, y, z)$ of a supersonic flow past a wing of finite span is described. Under the usual simplifying hypotheses this problem can be reduced to the determination of a solution of the equation $\varphi_{xx}+\varphi_{yy}-\varphi_{zz}=0$ for which, on the intersection of the wing with the (x, z)-axis (the symmetry axis of the wing), $(\partial\varphi/\partial y)_{y=0}$ is equal to a given function $\chi(x, z)$, and which vanishes on the envelope of the family of Mach cones with vortices along the leading edge. Using the formula of Volterra, the author obtains a representation for $\varphi(x, y, z)$ in terms of χ. The method is generalized for the case of a vibrating wing in a supersonic flow.

S. Bergman (Cambridge, Mass.).

Source: Mathematical Reviews, Vol. 9 No. 8

FAL'KOVICH, S. V.

Prikladnaia Matematika i Mekhanika, 1947, Vol. 11, No. 4, pp 459-464, "Plane Motion of Gas at Hypersonic Velocity," (Moskva. Institut Mekhaniki Akademii Nauk SSSR). Translations available at Battelle Memorial Institute, National Advisory Committee for Aeronautics, Technical Memorandum No. 1239, American Mathematical Society, Translation No. 10, Southwest Research; Brookhaven National Laboratory; and Library of Congress Translation Center, Translation No. RT-403.

"For plane, steady, irrotational, adiabatic flows the equation for the Legendre potential Φ = ux + vy - φ (φ - velocity potential) is shown to be of the Darboux type

$\Phi_{\lambda\mu}$ -L (μ - λ) (Φ_λ - Φ_μ) = 0..............................[1]

where λ, μ are the Mach variables. L is a function equal to 2/ (μ - λ) for small μ - λ, that is, for large Mach numbers (say, greater than 4). In this case Equation [1] can be solved by the formula

$$\Phi_{\lambda\mu} = \frac{\partial^2}{\partial\lambda\partial\mu} \quad \frac{X(\lambda) - Y(\mu)}{\lambda - \mu}$$

WHERE X and Y are two arbitrary functions. The general expressions for x, y, in terms of λ, μ, Φ_λ, Φ_μ, and the speed w, are given and computed in terms of X, Y, their derivatives, λ and μ. It is shown that the equation for the stream function, at large Mach numbers, is also of type [1[, with M = 3/ (μ - λ). In a last section of very simple derivation of the similarity index for transonic flows, (δ/1) (M^2 -1)3/2, and Tsien's similarity index for hypersonic flows, (δ/1) (M^2 - 1) 1/2 = (δ/1) M are given."

FAL'KOVICH, S.V.

Polubarinova-Kočina, P. Ya., and Fal'kovič, S. V. The theory of seepage of a fluid in porous media. Akad. Nauk SSSR. Prikl. Mat. Meh. 11, 629–674 (1947). (Russian)

This is a comprehensive report on the Russian contributions to the theory of seepage of an incompressible fluid through a porous medium. It gives a review of a great number of exact solutions for the corresponding steady and unsteady motion with or without a free surface. The paper contains a seven page bibliography. *A. Weinstein.*

Source: Mathematical Reviews, Vol 10, No. 1

FALKOVICH, S.V.

Falkovich, S. V. Plane motion of a gas at hypersonic velocity. Tech. Rep. no. F-TS-1221-IA (GDAM A9-T-40). Headquarters Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio. ii+11 pp. (1949).

Falkovich, S. V. Two-dimensional motion of a gas at large supersonic velocities. Tech. Memos. Nat. Adv. Comm. Aeronaut., no. 1239, 10 pp. (1949).

These are two independent translations from Akad. Nauk SSSR. Prikl. Mat. Meh. 11, 459-464 (1947); these Rev. 9, 476.

ical Reviews, Vol 11 No. 4

Mathematical Reviews
Vol. 15 No. 1
Jan. 1954
Mechanics

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Aero - 4

Ovsyannikov, L. V. The equations of transonic motion of a gas. Vestnik Leningrad. Univ. 1952, no. 6, 47–54 (1952). (Russian)

By perturbing uniform sonic flow the author first derives approximate equations for steady plane irrotational flow originally obtained by von Kármán [J. Math. Phys. 26, 182–190 (1947); these Rev. 9, 217] and S. V. Falkovich [Akad. Nauk SSSR Prikl. Mat. Mch. 11, 459–464 (1947); these Rev. 9, 476]. Then he obtains appropriate forms for the conditions at a strong shock and shows that the same system of partial differential equations is valid to the same order of accuracy in transonic rotational flow behind a curved shock. *J. H. Giese* (Havre de Grace, Md.).

4-20-54-CA

FAL'KOVICH, S. V. and Govyadinov, A. I.

"Stability of Slopes for a Definite State of Equilibrium"
Inzhenernyy sb., 14, 1953, 3-30

Mathematically, on the basis of the general solution by V. V. Sokolov the special two-dimensional problem of the stability of slopes has been solved in the case where a "critical " ~~uniformly~~ uniformly distributed load, which is the minimum of all loads able to cause a limiting stressed state in the medium possessing internal friction and cohesion, is present on the horizontal surfaces of a massif. The authors indicate a practical method for constructing the network of linear characteristics for given accuracy of computations and give a scheme of numerical integration of the differential equations of slope for initaial angle 90^0 and various angles of internal friction independently of the magnitude of cohesion and volumetric weight of the medium. (RZhGeol, No 6, 1955)

SO: Sum-No 12 Jan 56

FAL'KOVICH, S.V.

40-4-2/24

AUTHOR: FAL'KOVICH, S.V. (Saratov).

TITLE: On the Theory of Gas Rays (K teorii gazovykh struy).

PERIODICAL: Prikladnaya Mat.i Mekh., 1957, Vol.21, Nr 4, pp.459-464 (USSR)

ABSTRACT: A gas is assumed to flow with subsonic velocity through a symmetrical aperture out of a rectangular receptacle of width H. With the aid of the hodograph method the author shows that the solution of the problem comes to the solution of the Dirichlet problem for the Chaplygin equation

$$(1)\quad 4\tau^2(1-\tau)\frac{\partial^2\psi}{\partial\tau^2} + 4\tau\left[1+(\beta-1)\tau\right]\frac{\partial\psi}{\partial\tau} + \left[1-(2\beta+1)\tau\right]\frac{\partial^2\psi}{\partial\theta^2} = 0$$

where $\tau = \frac{v^2}{v_{max}^2}$, θ is the angle of the velocity vector with the x-axis (axis of symmetry of the receptacle) and ψ the stream function. Here (1) is defined in a semicircle with radius τ_1 and with a cut of length τ_0 on the ray $\theta=0$. The solution is sought in the two quadrants with radius τ_0 in the form

$$\psi^{(1)}(\theta,\tau) = -\frac{Q}{2} + \sum_{n=1}^{\infty} a_n z_n(\tau)\sin n\theta$$

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$$\psi^{(2)}(\theta,\tau) = +\frac{Q}{2} + \sum_{n=1}^{\infty} a_n z_n(\tau)\sin n\theta$$

and in the residual circular ring in the form

$$\psi^{(3)}(\theta,\tau) = -\frac{Q}{\pi}\theta + \sum_{n=1}^{\infty}\left[A_n Z_n(\tau) + B_n \varsigma_n(\tau)\right]\sin n\theta .$$

Here, according to Chaplygin, it is $z_n(\tau) = \tau^n F(a_n, b_n, 2n+1, \tau)$ where F is a hypergeometric series and

$$a_n + b_n = 2n - \beta \qquad a_n b_n = -\beta n(2n+1) ,$$

while

$$\varsigma_n(\tau) = \lim_{\nu\to -n}\left[Z_\nu(\tau) - \frac{(\nu-1)h_\nu \tau^{-\nu} F(a_\nu+2\nu,\ b_\nu+2\nu,\ 1-2\nu,\ \tau)}{(\nu+1)(\nu+n)}\right]$$

is the function already used by Cherry (Proc.of the Roy.Soc. of London, Ser.A, Vol.202, 1950). By application of the boundary conditions and by the demand that $\psi^{(3)}$ is the analytical continuation of $\psi^{(1)}$ and $\psi^{(2)}$ the author obtains a solution which represents a generalization of Chaplygin's solution in the case of an infinitely wide receptacle. It is

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On the Theory of Gas Rays

$$\frac{\pi}{Q}\psi^{3}(\theta,\tau) = -\theta - \sum_{n=1}^{\infty}\frac{\chi_n(\tau)}{n}\sin 2n\theta$$

where

$$\chi_n(\tau) = \frac{Z_n(\tau)}{Z_n(\tau_1)} - \frac{\tau_0}{(1-\tau_0)^{\beta}}\,\frac{\zeta_n(\tau_1)Z_n(\tau)-\zeta_n(\tau)Z_n(\tau_1)}{n\,Z_n(\tau_1)}\,Z_n'(\tau_0)$$

The formula can be generalized to the case of walls which form an acute angle with the axis of symmetry. With the aid of the formula the compression coefficient of the ray is calculated.

SUBMITTED: April 10, 1957

AVAILABLE: Library of Congress

CARD 3/3

FAL'KOVICH, S. V. (Saratov)

"Two-dimensional transonic gas flows."

report presented at the First All-Union Congress on Theoretical and Applied Mechanics, Moscow, 27 Jan - 3 Feb 1960.

FAL'KOVICH, S. V.

Asymptotic decomposition of Chaplygin functions. Izv. vys. ucheb. zav.; mat. no.2:209-212 '60. (MIRA 13:7)

1. Saratovskiy gosudarstvennyy universitet im. N.G. Chernyshevskogo. (Mathematical physics)

FAL'KOVICH, S.V.

p.2

S/003/60/000/009/001/001
B019/B054

AUTHOR: Frankl', F. I., Doctor of Physical and Mathematical Sciences, Professor

TITLE: Discussion of Problems of Hydroaerodynamics and Mathematical Physics

PERIODICAL: Vestnik vysshey shkoly, 1960, No. 9, pp. 47-48

TEXT: A Conference on Hydroaerodynamics and Mathematical Physics was held at Nal'chik in May 1960 on the initiative of the fiziko-matematicheskiy fakul'tet Kabardino-Balkarskogo universiteta (Department of Physics and Mathematics of the Kabardino-Balkarian University). Fourteen reports were delivered at the Conference by delegates of five higher institutes of learning and scientific institutes of the Northern Caucasus, as well as of three higher institutes of learning from other oblast' and Republics. The reports by Professor F. I. Frankl' and Senior Teacher I. N. Lanin (Kabardino-Balkarian University) on "The Flow Around Profiles With a Local Supersonic Zone Ending in a Compression

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Shock", by Professor S. V. Fal'kovich of Saratovskiy universitet (Saratov University) on "The Integrals of the Chaplygin Equation With Singular Points on the Parabolic Line", and Senior Teacher E. Kerimgaziyev of Kirgizskiy universitet (Kirgiz University) on "The Application of the Straight-line Method to Certain Boundary-value Problems in the Theory of Transsonic Currents" dealt with the theory of transsonic currents. Problems of theoretical meteorology were dealt with in the report by L. N. Gutman, Doctor of Physical and Mathematical Sciences, of the Kabardino-Balkarskoye otdeleniye Instituta prikladnoy geofiziki AN SSSR (Kabardino-Balkarian Branch of the Institute of Applied Geophysics of the AS USSR) ("On the Theory of Fronts"). Docent B. Ya. Slobodov of the Stavropol'skiy sel'skokhozyaystvennyy institut (Stavropol' Agricultural Institute) dealt with "Some Problems of Hydrodynamics Within the General Theory of Atmospheric Circulations". Mal'bakhov, Student of the Kabardino-Balkarian University, held a report on "The Vertical Structure of Monsoons". M. Zhekamukhov and N. Arkabayev, Post-graduate Students of the Kabardino-Balkarian University, offered "Examples of the Rotation of Cosmic Gas Masses" and "The Model of a Star

APPROVED FOR RELEASE: 03/13/2001 CIA-RDP86-00513R000412410016-2"

Discussion of Problems of Hydroaerodynamics and Mathematical Physics

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as Steady Radial Flow of Gas Particles and Photon Gas". A. Abdyldayev, Post-graduate Student of the Kabardino-Balkarian University, in his report dealt with "Some Problems of the Plane-parallel Flow of Heavy Liquids in Channels". Senior Teacher V. I. Men'shikova of the Stavropol'skiy pedagogicheskiy institut (Stavropol' Pedagogical Institute) delivered a report on "Semi-inverse Methods in the Theory of Motion of Ground Water With a Free Surface". Problems of mathematical physics were dealt with in three reports by Senior Teacher I. M. Karasev of the Kabardino-Balkarian University, Docent F. G. Baranovskiy of the Severoosetinskiy pedagogicheskiy institut (North Osetian Pedagogical Institute), and Docent Ye. I. Nesis of the Stavropol' Pedagogical Institute. Docent V. N. Karp of the Odesskiy politekhnicheskiy institut (Odessa Polytechnic Institute) dealt with the theory of oscillations. Special attention was paid to a report by Professor S. F. Fal'kovich who suggested a greatly improved method of calculating transsonic currents, to a report by Professor L. N. Gutman who suggested an interesting solution to one of the most important problems of local meteorological phenomena, and to a report by N. Arkabayev who gave an ingenious explanation of an important astrophysical

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Discussion of Problems of Hydroaerodynamics and Mathematical Physics

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phenomenon.

ASSOCIATION: Kabardino-Balkarskiy gosudarstvennyy universitet (Kabardino-Balkarian State University)

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28496
S/040/61/025/002/005/022
D201/D302

AUTHOR: Pal'kovich, S.V. (Saratov)

TITLE: The plane flow of gas in the sonic region with singular points on the sonic line

PERIODICAL: Prikladnaya matematika i mekhanika, v. 25, no. 2, 1961, 218 - 228

TEXT: The solution of different cases of planar flow of a gas without vortices at near-sonic speeds leads in the limiting case to an elliptic-hyperbolic equation, whose solution may have some singular points on the sonic line. The solution of such an equation (with singular points) is given by Trikomi's equation

$$\eta \frac{\partial^2 \psi}{\partial \theta^2} + \frac{\partial^2 \psi}{\partial \eta^2} = 0. \tag{1.1}$$

Chaplygin's investigations give the expression for the planar non-

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The plane flow of gas in ...

vortex adiabatic motion of a gas as

$$4\tau^2(1-\tau)\frac{\partial^2\psi}{\partial\tau^2} + 4\tau[1+(\beta-1)\tau]\frac{\partial\psi}{\partial\tau} + [1-(2\beta+1)\tau]\frac{\partial^2\psi}{\partial\theta^2} = 0 \qquad (2.1)$$

$$\left(\tau = \frac{v^2}{v_m^2},\ \beta = \frac{1}{\varkappa - 1},\ \tau = \tau_* = \frac{1}{2\beta+1} \text{ with } v = a_*\right)$$

where ψ is a function of the current, θ is the angle made by the velocity vector with a chosen fixed direction, v is the velocity of flow; v_m and v_* the maximum and critical velocities, and $\varkappa$ the thermal capacity. Replacing τ by the variable η, the author arrives at

$$\eta\frac{\partial^2\psi}{\partial\theta^2} + \frac{\partial^2\psi}{\partial\eta^2} + b(\eta)\frac{\partial\psi}{\partial\eta} = 0 \qquad (2.3)$$

$$b(\eta) = \frac{2\beta(2\beta+1)\tau^2\sqrt{\eta}}{[1-(2\beta+1)\tau]\sqrt{[1-(2\beta+1)\tau](1-\tau)}} - \frac{1}{2\eta}. \qquad (2.4)$$

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The plane flow of gas in ...

In the neighborhood of $\eta = 0$, b may be expressed by the series

$$b(\eta) = b_0 + b_1\eta + b_2\eta^2 + \dots \qquad (2.6)$$

$$b_0 = -\frac{2\varkappa + 5}{5(\varkappa + 1)^{2/3}}, \qquad b_1 = \frac{46\varkappa^2 + 105\varkappa + 125}{175(\varkappa + 1)^{4/3}}$$

Solving (2.3) when there are singular points on the sonic line η = = 0 by introducing new variables

$$\rho = +\sqrt{\theta^2 + \tfrac{4}{9}\eta^3}, \qquad t = \frac{\theta}{\rho} \qquad (3.1)$$

gives a solution of the form

$$\psi(\rho, t) = \rho^{\lambda} f_0(t) + \rho^{\lambda + \frac{2}{3}} f_1(t) + \rho^{\lambda + \frac{4}{3}} f_2(t) + \dots = \sum_{m=0}^{\infty} \rho^{\lambda + \frac{2}{3} m} f_m(t) \qquad (3.4)$$

and hence, in the usual way, a recurrence formula for the coeffi-

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The plane flow of gas in ...

cients $f_m(t)$ is obtained

$$(1-t^2)f_n'' - \frac{4}{3}tf_n' + \left(\lambda + \frac{2}{3}n\right)\left(\lambda + \frac{2}{3}n + \frac{1}{3}\right)f_n = \tag{3.5}$$

$$= \sum_{m=0}^{n-1} b_m \left(\frac{3}{2}\right)^{\frac{2m-1}{3}} (1-t^2)^{\frac{m+1}{3}} \left\{tf_{n-m-1}' - \left[\lambda + \frac{2}{3}(n-m-1)\right] f_{n-m-1}\right\}$$

$(n = 0, 1, 2, \ldots)$ (3.5)

The sonic flow on a v-shaped profile is considered. Taking $\lambda = -5/3$ gives

$$\psi_0(\theta, \eta) = \rho^{-5/3} f_0(t) + \rho^{-1} f_1(t) + \rho^{-1/3} f_2(t) + \rho^{1/3} f_3(t) + \cdots \tag{6.1}$$

and hence by substitution and simplification,

$$\psi_0(\theta, 0) = \frac{2}{5} 2^{1/3} B_0 \left[\theta^{-5/2} - \frac{2}{4} 3^{1/2} \left(b_1 + \frac{1}{3} b_0^2\right) \theta^{-1/2}\right] \tag{6.9}$$

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The plane flow of gas in ...

The equation for $s_n(\eta)$ is then obtained in the form

$$\frac{d^2 s_n}{d\eta^2} + b(\eta)\frac{ds_n}{d\eta} - \frac{\pi^2 n^2}{\delta^2} s_n = 0 \tag{7.1}$$

With the boundary conditions $s_n(+\infty) = 0$, $s_n(0) = 1$, the integral of (7.1) becomes single-valued, and may be expressed by Chaplygin's hypergeometric function

$$s_n(\eta) = \frac{z_\nu(\tau)}{z_\nu(\tau_*)}, \quad z_\nu(\tau) = \tau^\nu F(a_\nu, b_\nu, 2\nu + 1; \tau) \tag{7.2}$$

where $\nu = \frac{\pi n}{2\delta}$, $a_\nu + b_\nu = 2\nu - \beta$, $a_\nu b_\nu = -\beta\nu(2\nu + 1)$, $\tau_* = \frac{1}{2\beta + 1}$.

The infinite converging series

$$\psi(0, \eta) = \sum_{n=1}^{\infty} A_n s_n(\eta) \sin\frac{\pi n}{\delta}\theta \tag{7.3}$$

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is a particular solution of (2.3) with the boundary conditions of this case. The function

$$F_\lambda(\theta, \tau) = \sum_{n=1}^{\infty} \frac{1}{n^\lambda} \frac{z_{n/2}(\tau)}{z_{n/2}(\tau_*)} \sin n\theta \qquad (8.1)$$

is considered, which represents a solution of Chaplygin's equation (2.1). On the sonic line $\tau = \tau_*$, this becomes

$$F_\lambda(\theta, \tau_*) = \frac{1}{\Gamma(\lambda)(e^{2\pi i\lambda} - 1)} \int_{\infty}^{(0+1)} \frac{t^{\lambda-1} \sin \theta}{\operatorname{ch} t - \cos \theta} dt. \qquad (8.4)$$

From the current function

$$\psi(\theta, \tau) = C \sum_{n=1}^{\infty} \left(n^{\gamma_s} - \frac{a}{n^{\gamma_s}}\right) \frac{z_\nu(\tau)}{z_\nu(\tau_*)} \sin 2\nu\theta \qquad \left(\nu = \frac{\pi n}{2\delta}\right) \qquad (8.9)$$

and velocity potential φ, the distribution of the speed along the profile may be determined. A lamina (or profile with plane lower surface) is considered with angle of attack o to a stream of infinite velocity $v = a_*$. The plane hodograph has a point A through which all lines of flow pass. The solution is given by

$$\psi_0 = \psi_1 + \psi_2 = c\sum_{n=1}^{\infty}\left[\left(n^{1/2} - \frac{a}{n^{1/2}}\right)\sin n\theta + \frac{\gamma}{n^{1/2}}\cos n\theta\right]\frac{z_{n/2}(\tau)}{z_{n/2}(\tau_0)} \qquad (12.3)$$

where

$$\psi_1(\theta, \tau) = c\sum_{n=1}^{\infty}\left(n^{1/2} - \frac{a}{n^{1/2}}\right)\frac{z_{n/2}(\tau)}{z_{n/2}(\tau_0)}\sin n\theta \qquad (12.1)$$

$$\psi_2 = c\sum_{n=1}^{\infty}\frac{\gamma}{n^{1/2}}\frac{z_{n/2}(\tau)}{z_{n/2}(\tau_0)}\cos n\theta \quad (c, \gamma = \mathrm{const}) \qquad (12.2)$$

and

$$\bar{\psi}_0(\tau, \theta) = c\sum_{n=1}^{\infty}\left[\left(n^{1/2} - \frac{a}{n^{1/2}}\right)\sin n(\theta + 2\delta) - \frac{\gamma}{n^{1/2}}\; n\;(\theta + 2\delta)\right]\frac{z_{n/2}(\tau)}{z_{n/2}(\tau_0)}$$

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$$\psi = \psi_0 + \bar{\psi}_0 = c \sum_{n=1}^{\infty} \left[\left(n^{5/6} - \frac{a}{n^{5/6}} \right) \cos n\delta + \frac{\gamma}{n^{1/6}} \sin n\delta \right] \frac{z_{n/3}(\tau)}{z_{n/3}(\tau_0)} \sin n(\theta + \delta) \qquad (12.4)$$

is then the complete solution, giving

$$\psi = c \sum_{n=1}^{\infty} \left[\left(n^{5/6} - \frac{a}{n^{5/6}} \right) \sin \delta \cos n\delta + \frac{a-1}{n^{1/6}} \cos \delta \sin n\delta \right] \frac{z_{n/3}(\tau)}{z_{n/3}(\tau_0)} \sin n(\theta + \delta) \qquad (12.5)$$

There are 4 figures and 10 references: 9 Soviet-bloc and 1 non-Soviet-bloc. The reference to the English-language publication reads as follows: G. Guderley, The Flow over a Flat Plate with a Small Angle of Attack at Mach Number 1. J.A.S., v. 21, No. 4, 1954.

SUBMITTED: December 23, 1960

Card 8/8

FAL'KOVICH, S.V. (Saratov)

On the theory of quasi-linear equations. Prikl. mat. i mekh. 26 no.3:571-572 My-Je '62. (MIRA 16:5)
(Differential equations, Linear)

FAL'KOVICH, S.V.; CHERNOV, I.A. (Saratov)

"On similar solutions in transonic gas dynamics"

report presented at the 2nd All-Union Congress on Theoretical and Applied Mechanics, Moscow, 29 January - 5 February 1964.

BURMISTROV, Ye.F., dots., red.; VAGNER, V.V., prof., red.; LIBER, A.Ye., prof., red.; FAL'KOVICH, S.V., prof., red.; PERSHIN, A.I., st. prepodavatel', red.; PERSOVA, V.M., red.

[Work of young scientists; mathematics issue] Trudy molodykh uchenykh; vypusk matematicheskii. Saratov, 1964. 121 p. (MIRA 18:8)

1. Saratov. Universitet. 2. Kafedra matematiki i statistiki Saratovskogo ekonomicheskogo instituta (for Pershin).

FAL'KOVICH, S.V., prof., red.; TOKAREVICH, V.V., red.

[Transonic gas flows] Transzvukovye techeniia gaza; sbornik statei. Saratov, Izd-vo Saratovskogo univ., 1964. 176 p. (MIRA 18:8)

L 00594-66 EWT(d) IJP(c)

ACCESSION NR: AR5019353 UR/0124/65/000/007/B035/B035

SOURCE: Ref. zh. Mekhanika, Abs. 7B249 30 B

AUTHOR: Fal'kovich, S. V. 44,55

TITLE: One case of a solution to the Tricomi problem 16,44,55

CITED SOURCE: Sb. Transzvuk. techeniya gaza. Saratov, Saratovsk. un-t, 1964, 3-8 44,55

TOPIC TAGS: gas dynamics/ Tricomi equation, Tricomi problem analysis

TRANSLATION: The Tricomi problem is analyzed for the Tricomi equation in relation to a region in which the elliptical component is represented by a half-band. Nonuniform conditions at the walls are eliminated by means of integral transformation. A condition of the characteristic leads to expansion of the assigned function in series by functions

$$\psi_n(\theta) = [I_{1/3}(n\theta) + I_{-1/3}(n\theta)] \sin n\theta, \quad 0 \leq \theta \leq \pi/2;$$

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ACCESSION NR: AR5019353

0

Completeness of the system is assumed. The report contains errors. P. G. Barantsev

SUB CODE: ME ENCL: 00

Card 2/2 DP

L 00595-66 EWT(1)/EWP(m)/EWA(d)/FCS(k)/EWA(1)

ACCESSION NR: AR5019354 UR/0124/65/000/007/B035/B035

41
B

SOURCE: Ref. zh. Mekhanika, Abs. 7B250

AUTHOR: Fal'kovich, S. V.; Lemeshinskaya, O.M.

TITLE: A mildly supersonic flow past thin bodies

CITED SOURCE: Sb. Transzvuk. techeniya gaza. Saratov, Saratovsk. un-t, 1964, 9-21

TOPIC TAGS: flow analysis, distant shock wave, mild supersonic flow, supersonic flow, sonic flow, thin body flow/ Tricomi equation, Frankl Guderley solution

TRANSLATION: The authors discuss a flow behavior pattern in a shock wave region distant from a body. A solution to the Tricomi equation is formulated for this purpose which involves the sum of the known Frankl-Guderley solution (which describes sonic flow at a distance from a body) and a linear combination of partial solutions to the Tricomi equation with singularities at the same sonic point of the hodograph. Combination coefficients are found from conditions at the shock curve. A total of 20 coefficients are calculated. R. G. Barantsev

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ACCESSION NR: AR5019354

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SUB CODE: ME ENCL: 00

Card 2/2 *BP*

ACCESSION NR: AP4018050 S/0140/64/000/001/0125/0133

AUTHORS: Fal'kovich, S. V. (Saratov); Chernov, I. A. (Saratov)

TITLE: Theory of self-modeling transonic flows

SOURCE: IVUZ. Matematika, no. 1, 1964, 125-133

TOPIC TAGS: transonic flow, self-modeling flow, limiting line, asymptotic shock wave, hodograph plane, ideal compressible fluid, self-modeling solution

ABSTRACT: The authors investigate certain general properties of self-modeling transonic flows illustrated in an example by F. I. Frankl' for sonic flow far from an arbitrary profile. The limiting line demonstrated by L. D. Landau and Ye. M. Lifshits (Mekhanika sploshny*kh sred, str. 531-548. GITTL, M., 1956) belongs to that branch of the solution which can be discarded on physical grounds. Then the remaining branch does not contain limiting lines and determines continuous flow in every physical plane. The peculiarity of this flow is that the positive x axis is the line on which the flow is situated. In order to use this solution for describing sonic flow far from a profile, it is necessary to construct an asymptotic shock wave. Orig. art. has: 7 figures and 48 formulas.

ACCESSION NR: AP4027586 S/0040/64/028/002/0280/0284

AUTHORS: Fal'kovich, S. V. (Saratov); Chernov, I. A. (Saratov)

TITLE: Sonic gas flow about a body of rotation

SOURCE: Prikladnaya matematika i mekhanika, v. 28, no. 2, 1964, 280-284

TOPIC TAGS: sonic gas flow, gas flow, body of rotation, self-modelling problem, axisymmetric flow, self-modelling exponent, Guderley variable

ABSTRACT: K. Guderley and H. Yoshihara (An Axial-Symmetric Transonic Flow Pattern. Quart. Appl., Math. 1951, v. VIII, No. 4, Russk. per.: Guderley K. i Yosikhara X. Osesimmetrichny*ye transzvukovy*ye techeniya. Sb. "Mekhanika", 1953, vy*p. 2) used numerical methods to solve the self-modelling problem of axisymmetric transonic flow far from an arbitrary body. The authors assumed that to this solution there corresponds an exponent of the self-modelling property, equal to 4/7. In this present paper the authors present a particular family of self-modelling solutions which are algebraic on the s, t plane both for plane and axisymmetric flow, and they determine their corresponding exponents of the self-modelling property. The solution of Guderley and Yoshihara is contained in this family. It is shown

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ACCESSION NR: AP4027586

theoretically that the exponent of the self-modelling property of this solution is equal to 4/7. Orig. art. has: 36 formulas.

ASSOCIATION: Saratovskiy gosudarstvenny*y universitet (Saratov State University)

SUBMITTED: 10Dec63 DATE ACQ: 28Apr64 ENCL: 00

SUB CODE: AI NO REF SOV: 005 OTHER: 001

Card 2/2

L 32880-65 EWT(1)/EWP(m)/EWG(v)/FCS(k) Pd-1/Pe-5 WW
ACCESSION NR: AP5005542 S/0147/65/000/001/0111/0114

AUTHORS: Fal'kovich, S. V.; Bol'man, M. G.

30
B

TITLE: On the pressure coefficient at hypersonic speeds

SOURCE: IVUZ. Aviatsionnaya tekhnika, no. 1, 1965, 111-114

TOPIC TAGS: hypersonic flow, pressure coefficient, wedge flow, ideal gas flow, Mach number

ABSTRACT: The pressure coefficient C_p for a wedge in a symmetric, hypersonic, ideal gas stream was calculated using an expansion technique in powers of sin Θ, where Θ is the wedge half angle. The expansion yields

$$C_p = A_1 \sin^2\theta + A_2 \sin^4\theta + \cdots + (B_1 \sin\theta + B_2 \sin^3\theta + B_3 \sin^5\theta + \ldots)\times$$
$$\times\sqrt{4(1-\varepsilon^2)\varepsilon^2 + C_1 \sin^2\theta + C_2 \sin^4\theta + C_3 \sin^6\theta},$$

where the A's and the B's are known functions of the gas specific heat ratio and the free stream Mach number M_∞. For $M_\infty \to \infty$ the E. Carafoli expression (On a unitary formula for compression-expansion in supersonic-hypersonic flow. Revue de

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L 32880-65
ACCESSION NR: AP5005542

mécanique appliquée, t. VII, No. 5, pp. 867-876, 1962) is recovered, which is

$$\frac{C_p}{m^2 \sin^2\theta} = \frac{\varkappa+1}{2} + \sqrt{\left(\frac{\varkappa+1}{2}\right)^2 + \frac{4}{K'^2}}.$$

All these equations for C_p become inaccurate at large values of θ. Therefore, another expansion is carried out in terms of $1/M_\infty^2$ for large θ and $M_\infty > 3.5$. Orig. art. has: 11 formulas.

ASSOCIATION: none

SUBMITTED: 04May64 ENCL: 00 SUB CODE: ME

NO REF SOV: 004 OTHER: 001

Card 2/2

L 14899-66 EWT(d) IJP(c) GS

ACC NR. AT6001782 SOURCE CODE: UR/0000/64/000/000/0003/0008

AUTHOR: Fal'kovich, S. V.

ORG: Saratov State University (Saratovskiy gosudarstvennyy universitet) 47 B+1

TITLE: On one case of the solution of the Tricomi problem

SOURCE: Transzvukovyye techeniya gaza (Transonic gas flows); sbornik statey. Saratov, Izd-vo Saratovskogo univ., 1964, 3-8

TOPIC TAGS: transonic flow, Tricomi problem, Bessel function, hodograph, gas flow, boundary value problem, 16, 44, 55

ABSTRACT: The Tricomi equation is solved by an infinite series expansion method given as products of Bessel functions and trigonometric functions. The Tricomi equation is given by

$$\eta\frac{\partial^2\psi}{\partial\theta^2}+\frac{\partial^2\psi}{\partial\eta^2}=0$$

satisfying the conditions

$$\psi(0,\eta)=f_1(\eta)$$
$$\psi(\pi,\eta)=f_2(\eta)$$

in the region D_1+D_2 as shown in the hodograph plane (see Fig.1). The solution of this equation is obtained as the sum $\psi=\psi_1(\theta,\eta)+\psi_2(\theta,\eta)$ satisfying the

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ACC NR: AT6001782

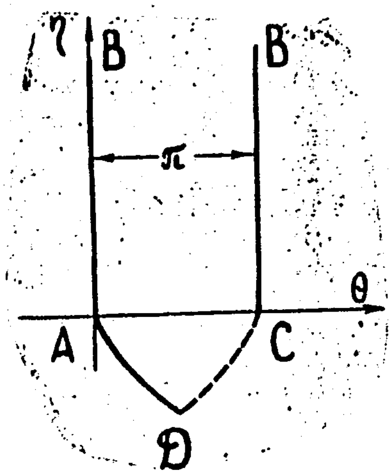

Fig. 1.

conditions

$$\psi_1(0,\eta)=f_1(\eta)\quad \psi_1(\pi,\eta)=f_2(\eta)\quad \left(\frac{\partial\psi_1}{\partial\eta}\right)_{\eta=0}$$
$$\psi_2(0,\eta)=0\quad \psi_2(\pi,\eta)=0\quad \psi_2(\theta,+\infty)=0.$$

The expression for ψ_1 is obtained as the integral

$$\Psi_1(\theta\eta)=\int_0^\infty f_1(t)t^{1/3}K(t\pi-\theta\eta)dt+\int_0^\infty f_2(t)t^{1/3}K(t,\theta,\eta)dt$$

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L 14899-66

ACC NR: AT6001782

whose kernel is given by

$$K(t\theta\eta)=\frac{2}{3}\sqrt{\eta}\int_0^\infty \lambda J_\varkappa\left(\frac{2}{3}\eta^{3/2}\lambda\right)J_{-\varkappa}\left(\frac{2}{3}t^{3/2}\lambda\right)\frac{\operatorname{sh}\lambda\theta}{\operatorname{sh}\lambda\pi}\,d\lambda.$$

The expression for ψ_2 is given by the infinite series

$$\Psi_2(\theta,\eta)=\sum_{n=1}^{\infty}A_n Ai(n^{\varkappa}\eta)\sin n\theta,$$

where the Ai stand for Airy functions. In the region D_2 the expression for ψ is given by the infinite series

$$\Phi(\theta)=\sum_{n=1}^{\infty}B_n[J_\varkappa(n\theta)+J_{-\varkappa}(n\theta)]\sin n\theta$$

which is the product of Bessel functions and trigonometric functions. Orig. art. has: 22 equations and 1 figure.

SUB CODE: 20,12/ SUBM DATE: 21Jul64/ ORIG REF: 002/ OTH REF: 001

Card 3/3

L 14904-66 EWT(1)/EWP(m)/EWA(d)/FCS(k)/EWA(1) GS

ACC NR: AT6001783 SOURCE CODE: UR/0000/64/000/000/0009/0021

AUTHORS: Fal'kovich, S. V.; Lemeshinskaya, O. M.

57
B+1

ORG: Saratov State University (Saratovskiy gosudarstvennyy universitet)

TITLE: A weakly transonic flow over slender bodies

SOURCE: Transzvukovyye techeniya gaza (Transonic gas flows); sbornik statey. Saratov, Izd-vo Saratovskogo univ., 1964, 9-21

TOPIC TAGS: adiabatic flow, transonic flow, gas dynamics, ideal gas, gas flow, flow field, slender body, boundary value problem, hodograph 1,55

ABSTRACT: The flow of an ideal gas at transonic speeds over slender two-dimensional bodies is analyzed. The flow is assumed to be adiabatic and irrotational and is shown schematically on Fig. 1. The flow field in the region CEAFD is investigated in detail, using the Tricomi boundary value problem. The solution is carried out on the hodograph plane (see Fig. 2), using similarity parameters

$$\eta=\left(\frac{3}{4}\int_{\tau}^{\tau_*}\sqrt{\frac{1-(2\beta+1)\tau}{1-\tau}}\frac{d\tau}{\tau}\right)^{2/3},\quad \tau=\left(\frac{v}{v_{max}}\right)^2,\quad \beta=\frac{1}{\varkappa-1},$$

and the Tricomi stream function equation

$$\Psi_{\eta\eta}+\eta\Psi_{\theta\theta}=0.$$

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L 14904-66

ACC NR: AT6001783

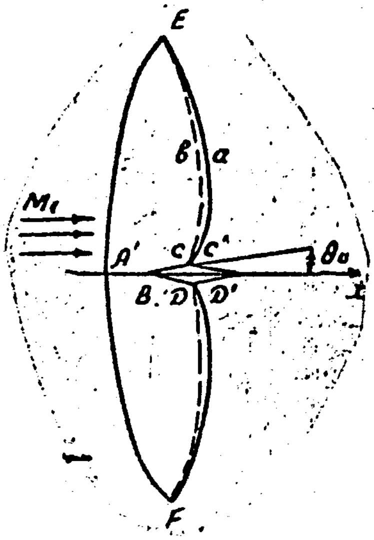

Fig. 1.

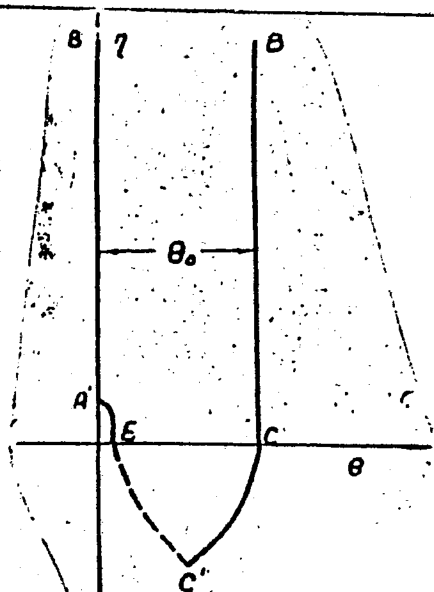

Fig. 2.

Following the method of F. I. Frankl' (O zadachi S. A. Chaplygina dlya smeshannykh do- i sverkhzvukovykh techeniy. Izv. AN SSSR, ser. matem., 9 (1945), 121-143), the particular solution of the Tricomi equation is given for the stream function $\bar{\Psi}$

$$\Psi(\bar{\theta},\bar{\eta})=\Psi_0(\bar{\theta},\bar{\eta})+\bar{\theta}\sum_{k=1}^{\infty}A_k\rho^{-2k-1/6}\cdot F\left(-k,k+\frac{7}{6};\frac{3}{2};s^2\right).$$

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ACC NR: AT6001783

where the coefficients A_k are determined numerically up to $k = 20$. The solution away from the body is obtained in the physical plane by means of the coordinate transformation

$$\left.\begin{aligned} x &= \frac{(\varkappa+1)^{\varkappa}}{v^{\bullet}\rho^{\bullet}}\int \Psi_{\tau}\,d\theta \\ y &= \frac{1}{v^{\bullet}\rho^{\bullet}}\Psi \end{aligned}\right\}.$$

Orig. art. has: 16 equations and 6 figures.

SUB CODE: 20/ SUBM DATE: 21Jul64/ ORIG REF: 004/ OTH REF: 003

Card 3/3

109-4-10/20

AUTHOR: Fal'kovich, S.Ye.

TITLE: Accuracy of Reading the Range Co-ordinate in Radar Systems. (O tochnosti otscheta koordinaty dal'nosti v radiolokatsionnykh sistemakh)

PERIODICAL: Radiotekhnika i Elektronika, 1957, Vol.2, No.4, pp. 450 - 460 (USSR)

ABSTRACT: The receiver of the system consists of a linear h.f. amplifier (comprising the input amplifier, frequency changer and intermediate frequency amplifier), an intertialess detector and a video-amplifier. Frequency characteristics of the radio and video-amplifiers are k(f) and K(f), respectively, and their Fourier transforms (or impulse characteristics) are h(t) and H(t). The input signal is in the form:

$$X_0(t) = A_0(t - \tau_0) + W_0(t) \qquad (4)$$

where $W_0(t)$ is a white noise signal having a spectral intensity σ^2 and $A_0(t - \tau_0)$ is the useful pulse signal, which can be represented by:

$$A_0(t - \tau_0) = V_0(t - \tau_0)\cos(2\pi f_0 t + \varphi) \qquad (5)$$

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Accuracy of Reading the Range Co-ordinate in Radar Systems.

where $V_0(t)$ is the envelope of the signal, τ_0 is its delay time, φ is the phase of the oscillations and f_0 is the centre frequency of the system. Transfer of the input signal $X_0(t)$ through the various stages of the receiver is analysed in detail and expressions for the output signal $X_3(t)$ are derived for the following cases: 1) linear detection of a strong pulse signal; 2) square-law detection of a strong signal and 3) detection of weak signals. The range co-ordinate at the receiver is determined by measuring the delay time t_3, of the received signal which is equal to:

$$t_3 = \tau_0 + \tau_r + \delta \tag{29}$$

τ_r is the delay time of the receiver and δ is the error of the measurement of the time delay (due to the noise). General expressions for the error δ and its dispersion δ are derived for the following methods of measuring t_3: 1) determining the positions of the output signal maxima; 2) determining the instant when the output signal reaches a predetermined

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Accuracy of Reading the Range Co-ordinate in Radar Systems.

value and 3) automatic range tracking (by employing an auxiliary strobing function). These formulae are used to determine δ for the case of a linear detection of strong signals. It is shown that, when measuring the position of the signal maxima, the minimum value of δ^2 is obtained when:

$$H_{\Sigma} = CU_o(\tau_r - t) \qquad (65)$$

where:

$$H_{\Sigma} = \int_{-\infty}^{+\infty} h(y)H(t - y)\, dy \qquad (22)$$

and C is a constant; for these conditions:

$$\overline{\delta^2_{min}} = 1/q^2\beta^2 \qquad (66)$$

where q^2 is the signal-to-noise (energy) ratio at the input of the receiver and β^2 is a parameter depending on the shape of the signal:

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$$\beta^2 = \int_{-\infty}^{+\infty} \left| \dot{U}_0(z) \right|^2 dz \Big/ \int_{-\infty}^{+\infty} U_0^2(z) dz . \qquad (68)$$

Similarly, it is shown that for the other two methods of determining the range τ_m can also be made equal to $1/q^2\beta^2$, but the overall impulse characteristic of the receiver should be proportional to the derivative of the envelope of the pulse signals, i.e.

$$H_\Sigma(t) = c\dot{U}_0(\tau_r - t) . \qquad (71)$$

The paper contains 3 references, of which 2 are Slavic.

SUBMITTED: July 23, 1956.

AVAILABLE: Library of Congress.

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